NGS Shoreline: The Geographic Cell

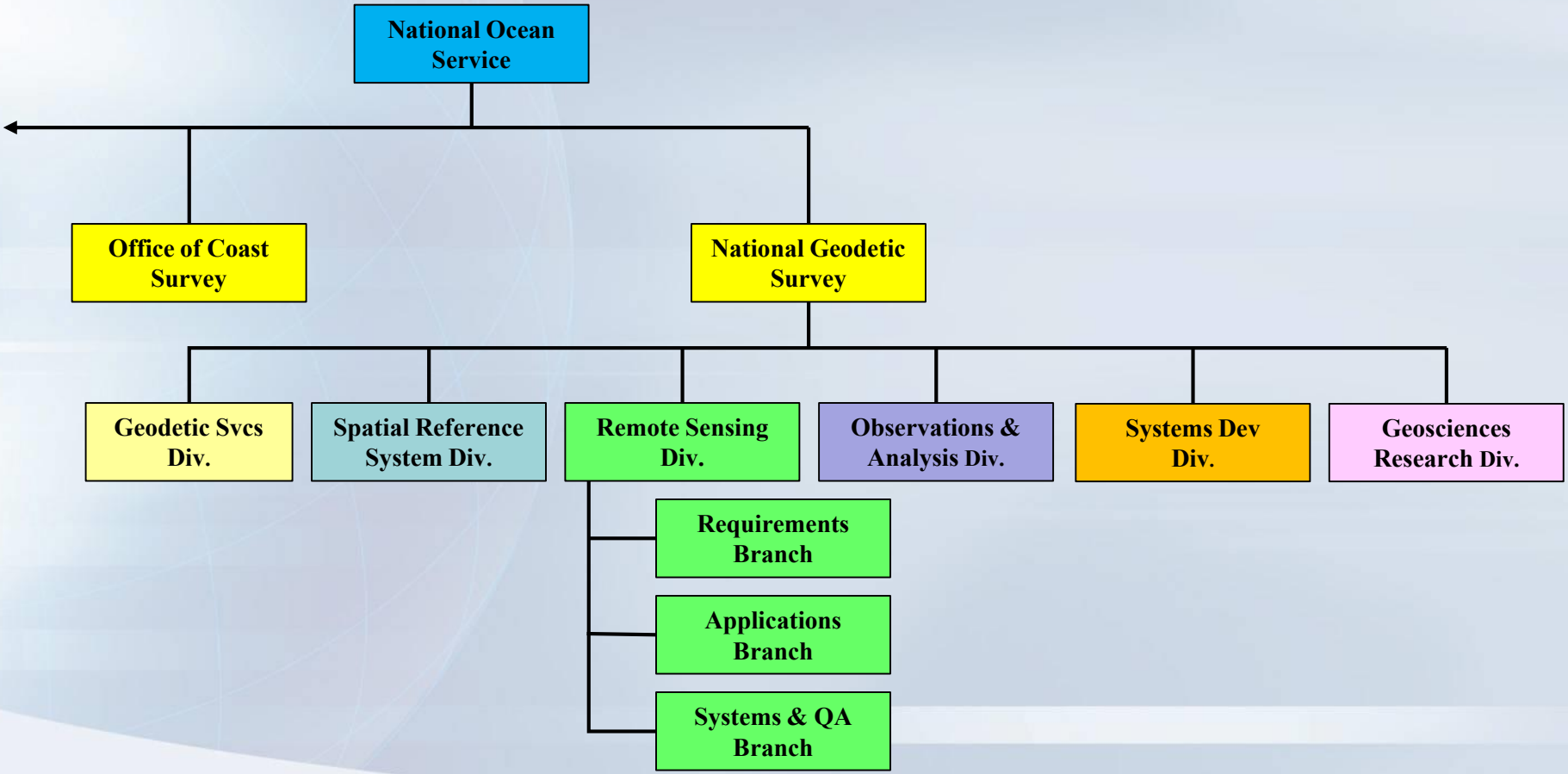
Tim Blackford
Lead CMP Quality Assurance Cartographer, NGS/NOAA

Michael Espey
Chief, Applications Branch, NGS/NOAA

2nd Annual NOAA Nautical Cartography Open House
NOAA Science Center, Silver Spring, MD
July 27, 2018

National Oceanic and Atmospheric Administration

Who is NGS / RSD?



National Oceanic and Atmospheric Administration

National Shoreline

NGS's Remote Sensing Division works to produce an accurate, consistent, and up-to-date national shoreline.

Primary application:

- **NOAA nautical chart updates**

Other important applications:

- **Defining U.S. territorial limits**
- **Coastal resource management**
- **Modeling storm surge and coastal flooding**
- **GIS analysis, etc.**

National Oceanic and Atmospheric Administration

Updating Nautical Charts

The primary base mapping data for nautical charts consist of two parts:

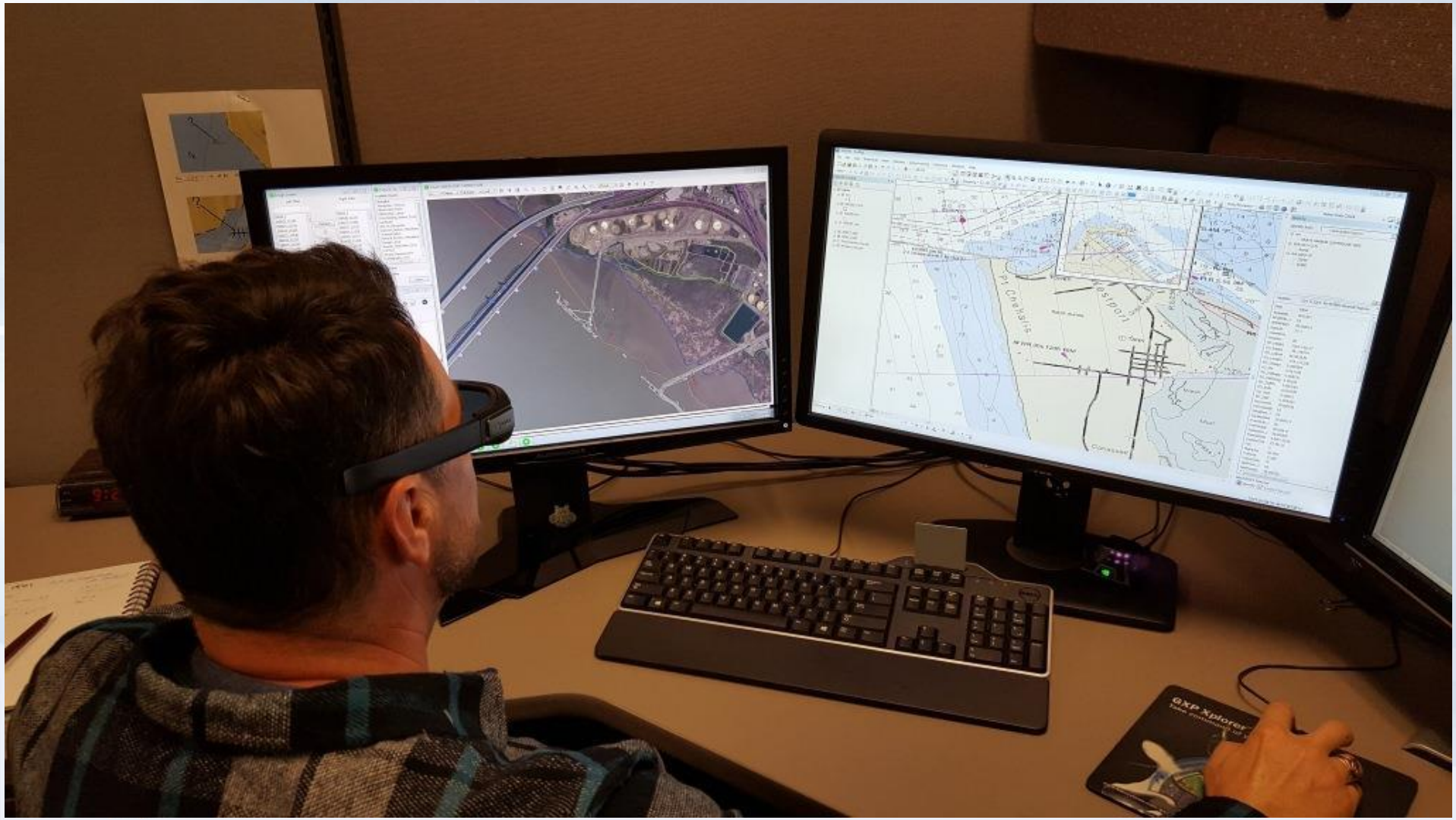
TOPOGRAPHY + HYDROGRAPHY (+Additional Info) = NAUTICAL CHART

National Oceanic and Atmospheric Administration

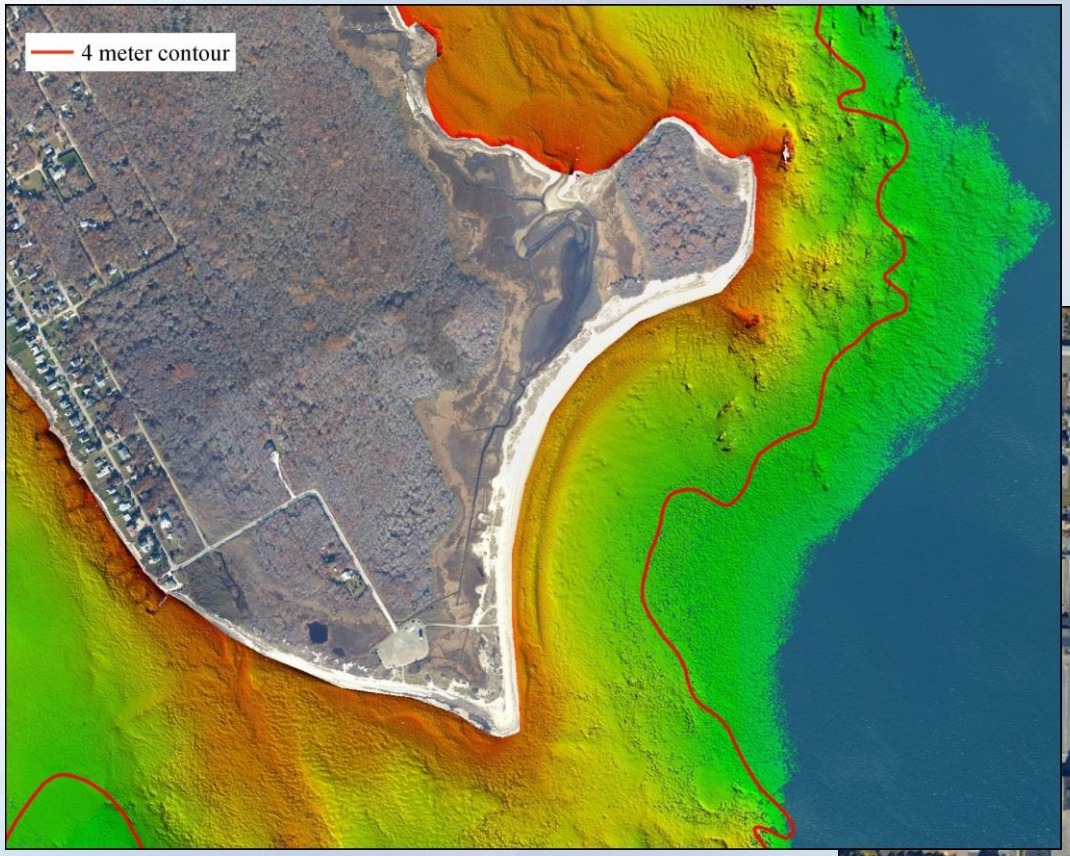
Updating Nautical Charts

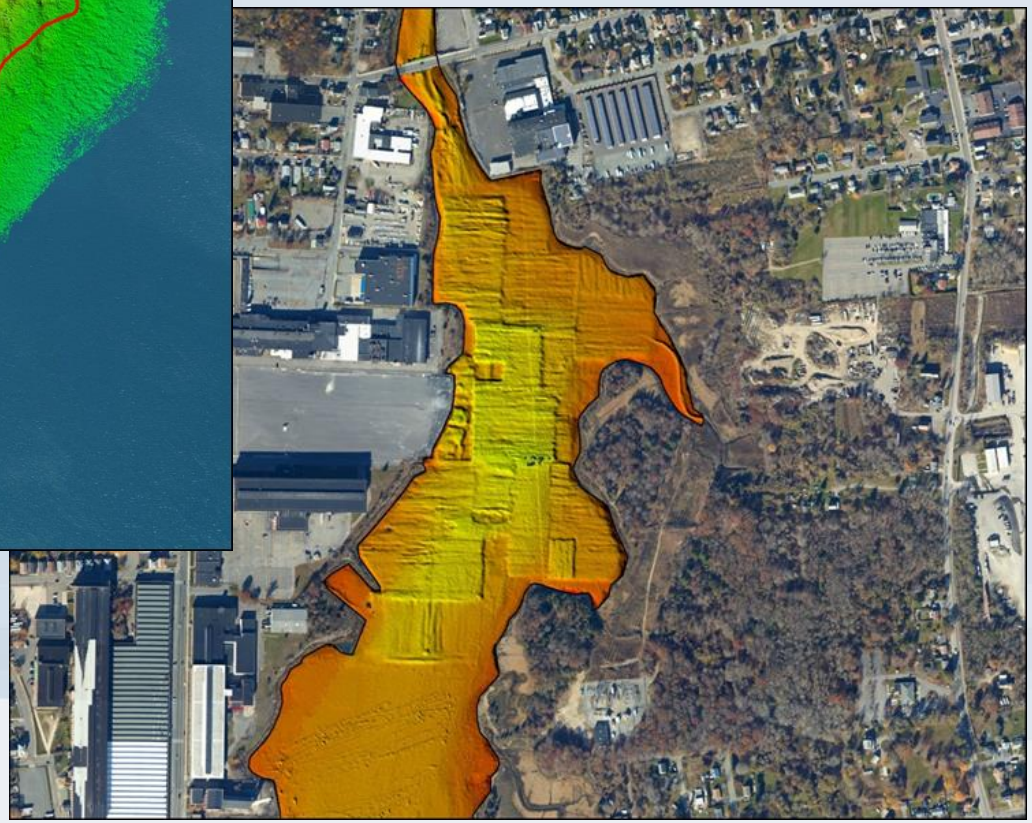
NGS Remote Sensing Division produces the topography

Softcopy photogrammetry is used to map the shoreline and nearshore features for application to nautical charts



Topo-bathy Lidar derived shoreline and near-shore bathymetry to update NOAA Nautical Charts

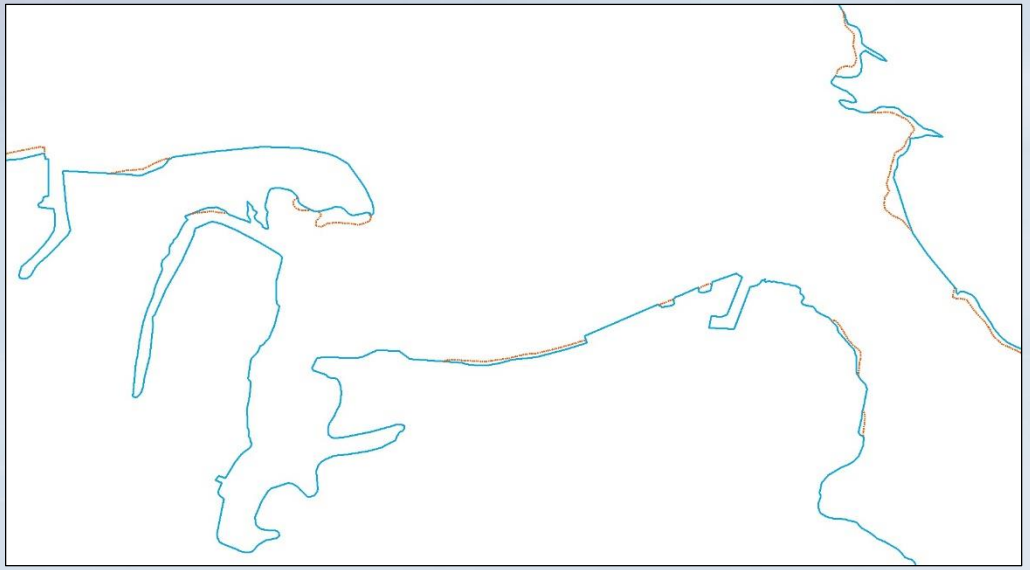


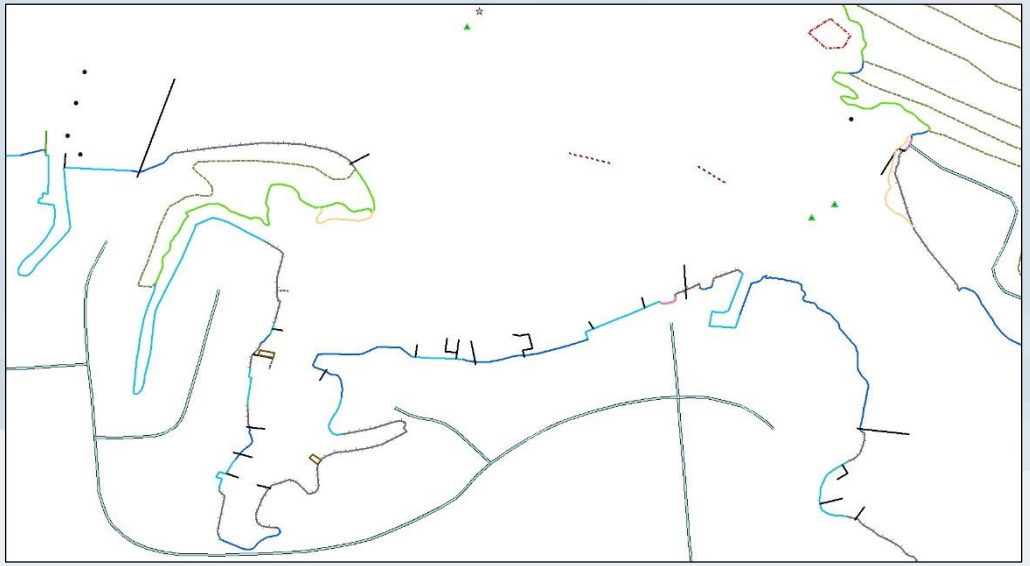


National Oceanic and Atmospheric Administration

Typically both of these technologies, photogrammetry and topo-bathy lidar, are used together in a hybrid approach.

- The MHW and MLLW contour lines are derived from the Lidar data
- Segmented and attributed with the appropriate type of shoreline
- Edited to compilation scale
- Additional features compiled from imagery





National Oceanic and Atmospheric Administration

Shoreline Data Format

The Coastal Cartographic Object Attribute Source Table (C-COAST) was developed to be compatible with our earlier digital mapping format, while allowing our data to be easily translated into IHO S-57 standard attribution used for NOAA ENCs, and to support FGDC standard metadata.

Table

softcopyl1

FEATURE	SOURCE_ID	DATA_SOURC	SRC_DATE	HOR_ACC	INFORM	RESOLUTION	ATTRIBUTE	CLASS	EXT_METH	EXTRACT_TE
53	GC11192	D	20130417	0.9		0	Pier.Fixed	ALONGSHORE FEATURE	S	S
50	GC11192	D	20130417	0.9		0	Marine Railway.Bare	ALONGSHORE FEATURE	S	S
50	GC11192	D	20130417	0.9		0	Marine Railway.Bare	ALONGSHORE FEATURE	S	S
51	GC11192	D	20130417	0.9		0	Marine Railway.Covers/Uncovers Or Submerged	ALONGSHORE FEATURE	S	S
51	GC11192	D	20130417	0.9		0	Marine Railway.Covers/Uncovers Or Submerged	ALONGSHORE FEATURE	S	S
154	GC11192	D	20130417	0.9		0	Pipeline.Submerged Or Surface	CULTURAL FEATURE MISCELLANEOUS	S	S
54	GC11192	D	20130417	0.9		0	Pier.Floating	ALONGSHORE FEATURE	S	S
54	GC11192	D	20130417	0.9		0	Pier.Floating	ALONGSHORE FEATURE	S	S
29	GC11192	D	20130418	0.9		0	Breakwater.Bare	ALONGSHORE FEATURE	S	S
84	GC11192	D	20130418	0.9	Mooring platform	0	Platform.Floating	OBSTRUCTION LINEAR	S	S
80	GC11192	D	20130417	0.9		0	Floating Drydock	OBSTRUCTION LINEAR	S	S
80	GC11192	D	20130417	0.9		0	Floating Drydock	OBSTRUCTION LINEAR	S	S
91	GC11192	D	20130417	0.9	Pier ruins	0	Ruins.Undetermined.Covers/Uncovers	OBSTRUCTION LINEAR	S	S
91	GC11192	D	20130417	0.9	Pier ruins	0	Ruins.Undetermined.Covers/Uncovers	OBSTRUCTION LINEAR	S	S
91	GC11192	D	20130417	0.9	Pier ruins	0	Ruins.Undetermined.Covers/Uncovers	OBSTRUCTION LINEAR	S	S
91	GC11192	D	20130417	0.9	Pier ruins	0	Ruins.Undetermined.Covers/Uncovers	OBSTRUCTION LINEAR	S	S
55	GC11192	D	20130417	0.9		0	Pier.Ruins	ALONGSHORE FEATURE	S	S
91	GC11192	D	20130417	0.9	Pier ruins	0	Ruins.Undetermined.Covers/Uncovers	OBSTRUCTION LINEAR	S	S
91	GC11192	D	20130417	0.9	Pier ruins	0	Ruins.Undetermined.Covers/Uncovers	OBSTRUCTION LINEAR	S	S
91	GC11192	D	20130417	0.9	Pier ruins	0	Ruins.Undetermined.Covers/Uncovers	OBSTRUCTION LINEAR	S	S
55	GC11192	D	20130417	0.9		0	Pier.Ruins	ALONGSHORE FEATURE	S	S
55	GC11192	D	20130417	0.9		0	Pier.Ruins	ALONGSHORE FEATURE	S	S
55	GC11192	D	20130417	0.9		0	Pier.Ruins	ALONGSHORE FEATURE	S	S
91	GC11192	D	20130417	0.9	Pier ruins	0	Ruins.Undetermined.Covers/Uncovers	OBSTRUCTION LINEAR	S	S
143	GC11192	D	20130418	0.9		0	Building	CULTURAL FEATURE MISCELLANEOUS	S	S

0 (0 out of 1414 Selected)

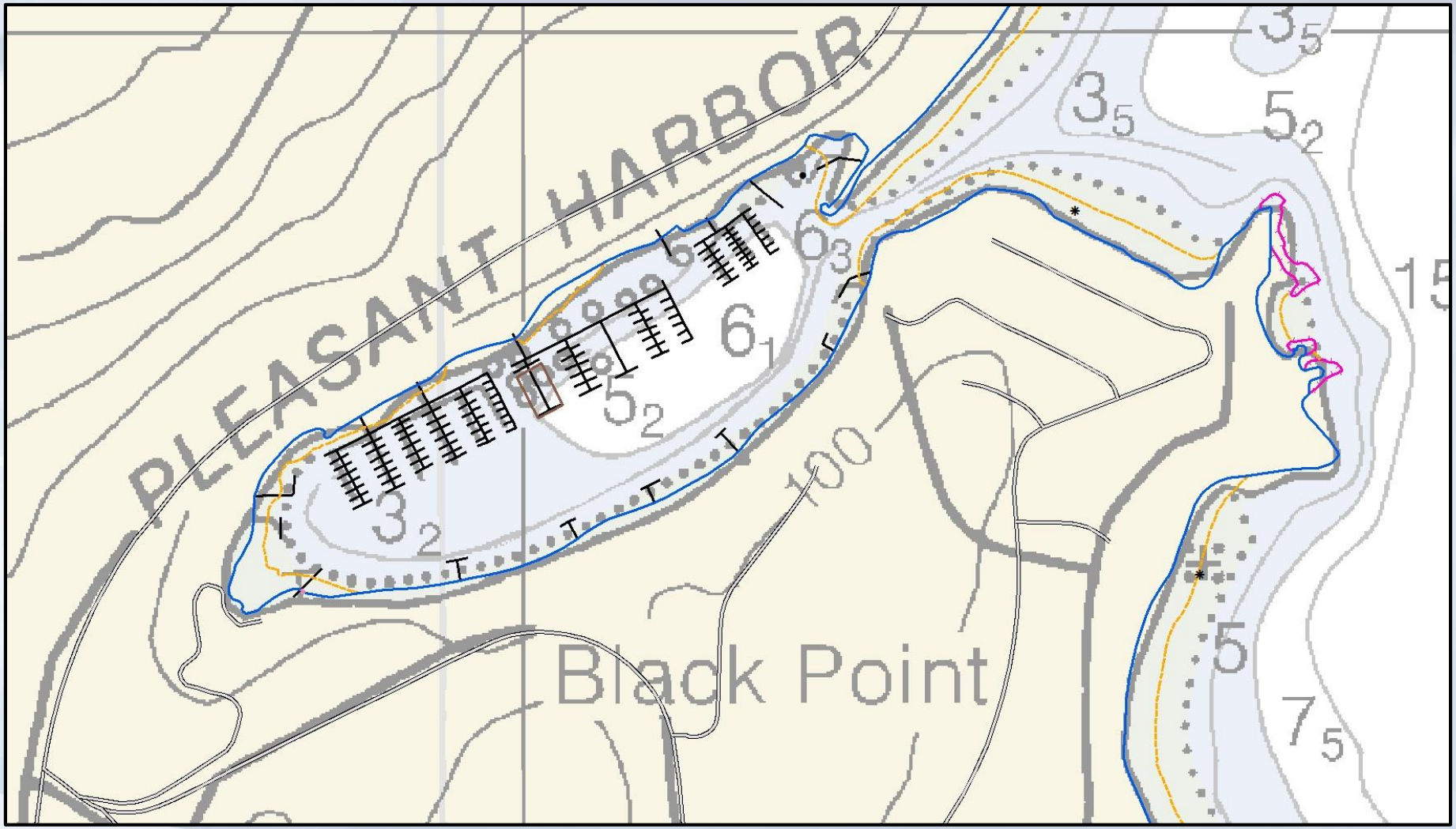
softcopyl1


Landmark
Transportation
Obstruction Point
Cultural Feature Miscellaneous
Aid To Navigation
Obstruction Linear
Freestanding
Shoreline
Danger Area
Contour

C-COAST to S-57 Translation

C-COAST ***CLASS*** / Attribute	S-57 Translation
SHORELINE	
Man-made.Bulkhead Or Sea Wall	SLCONS;catslc 10
Man-made.Bulkhead Or Sea Wall.Ruins	SLCONS;catslc 10;condtn 2
Man-made.Canal.Navigable	CANALS;catcan 1
Man-made.Canal.Non-Navigable	CANALS;catcan 2
Man-made.Drydock.Permanent	DRYDOC;status 1
Man-made.Lock	LOKBSN
Man-made.Ramp	SLCONS;catslc 12
Man-made.Rip Rap	SLCONS;catslc 8
Man-made.Slipway	SLCONS;catslc 13
Man-made.Wharf Or Quay	SLCONS;catslc 6
Man-made.Wharf Or Quay.Ruins	SLCONS;catslc 6;condtn 2
Natural.Apparent.Marsh Or Swamp	COALNE;catcoa 8;quapos 4
Natural.Apparent.Mangrove Or Cypress	COALNE;catcoa 7;quapos 4
Natural.Glacier	COALNE;catcoa 6;quapos 9
Natural.Great Lake Or Lake Or Pond	COALNE;inform Lakeshore
Natural.Mean High Water	COALNE;inform Meanhighwater
Natural.Mean High Water.Approximate	COALNE;quapos 4
Natural.River Or Stream	COALNE;inform River
Natural.River Or Stream.Approximate	COALNE;quapos 4
ALONGSHORE FEATURE	
Breakwater.Bare	SLCONS;catslc 1;watlev 2
Bridge.Fixed	BRIDGE;catbrg 1
Bridge.Footbridge	BRIDGE;catbrg 9

GC Compilation Scale

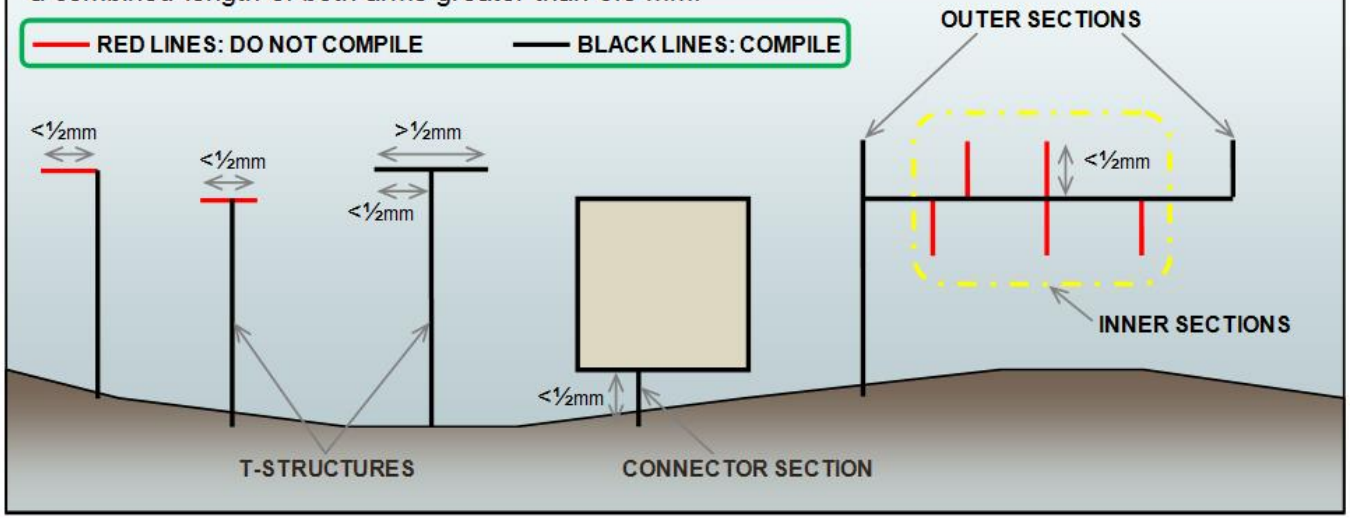


GC Scale = Chart Scale or 1:24,000
(whichever is greater)

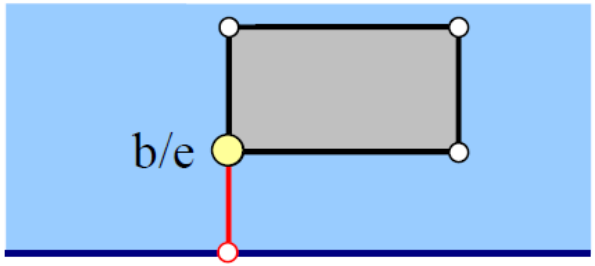
Chart: 1:40,000
GC: 1:24,000

GC Compilation Rules

All of these alongshore features project more than 0.5 mm from the shoreline, but contain sections that are less than 0.5 mm in length. Small connector sections shall be compiled. Small outer sections that project seaward from the main structure shall be compiled, but inner sections shall not. Small sections that are parallel to the shore shall not be compiled, except for the end of a T-structure having a combined length of both arms greater than 0.5 mm.

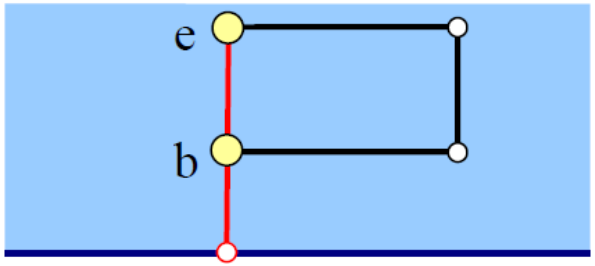


Area pier (double-line delineation)



This shows a pier in two sections, including a small linear portion (red) extending from shore and connecting to a larger section (black), which is a solid surface, more than 0.5 mm wide at the compilation scale. The larger section is compiled as one segment beginning (b) and ending (e) at the same vertex, thus representing a polygon.

Perimeter pier (single-line delineation)

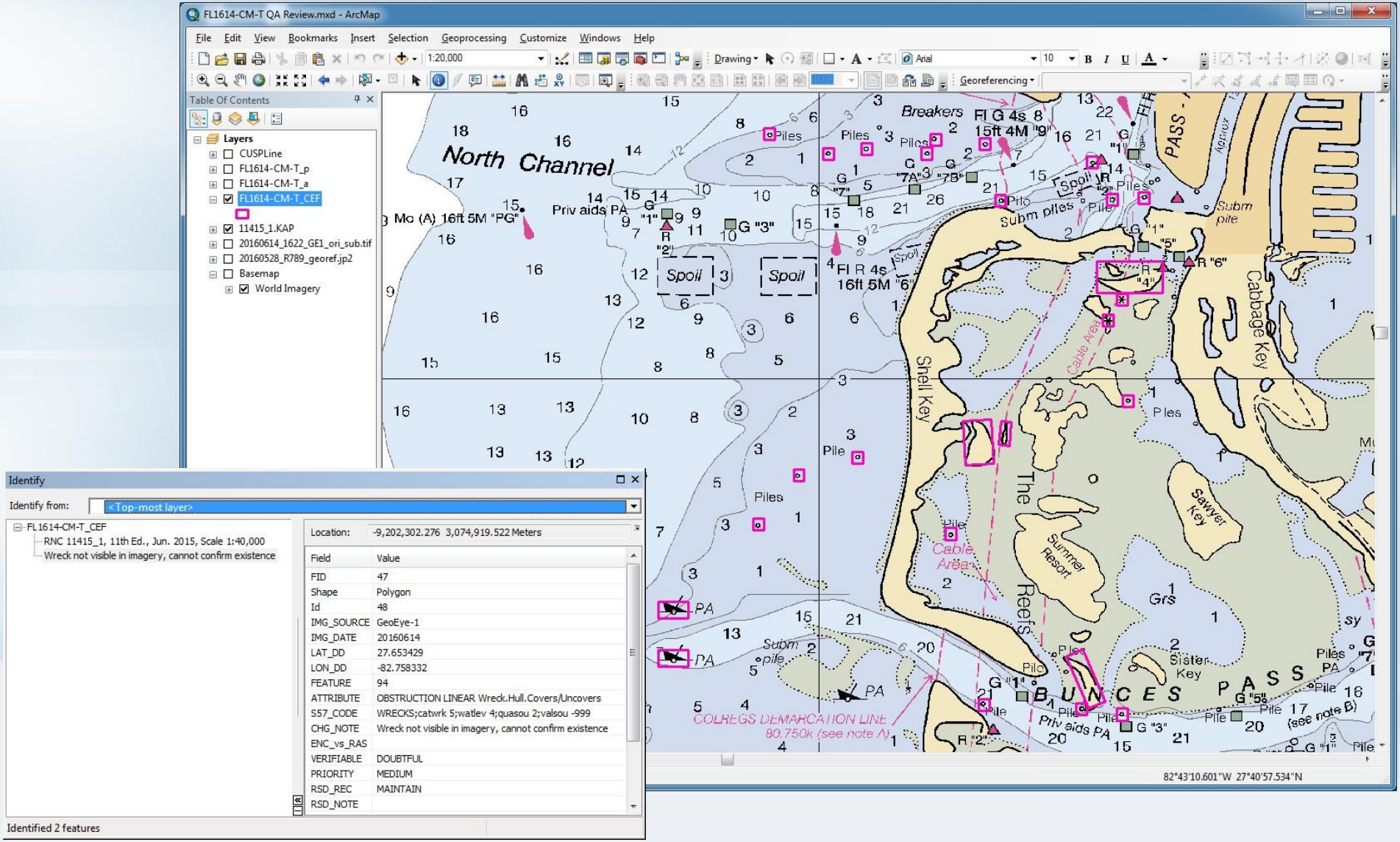


This shows another pier in two sections, although in this case *both* sections of pier surface are less than 0.5 mm wide. To ensure that the pier is properly symbolized on the chart as "open" (water in the interior) rather than a solid surface, the black segment is intentionally delineated with *separate* beginning and ending points.

GC Compilation Rules

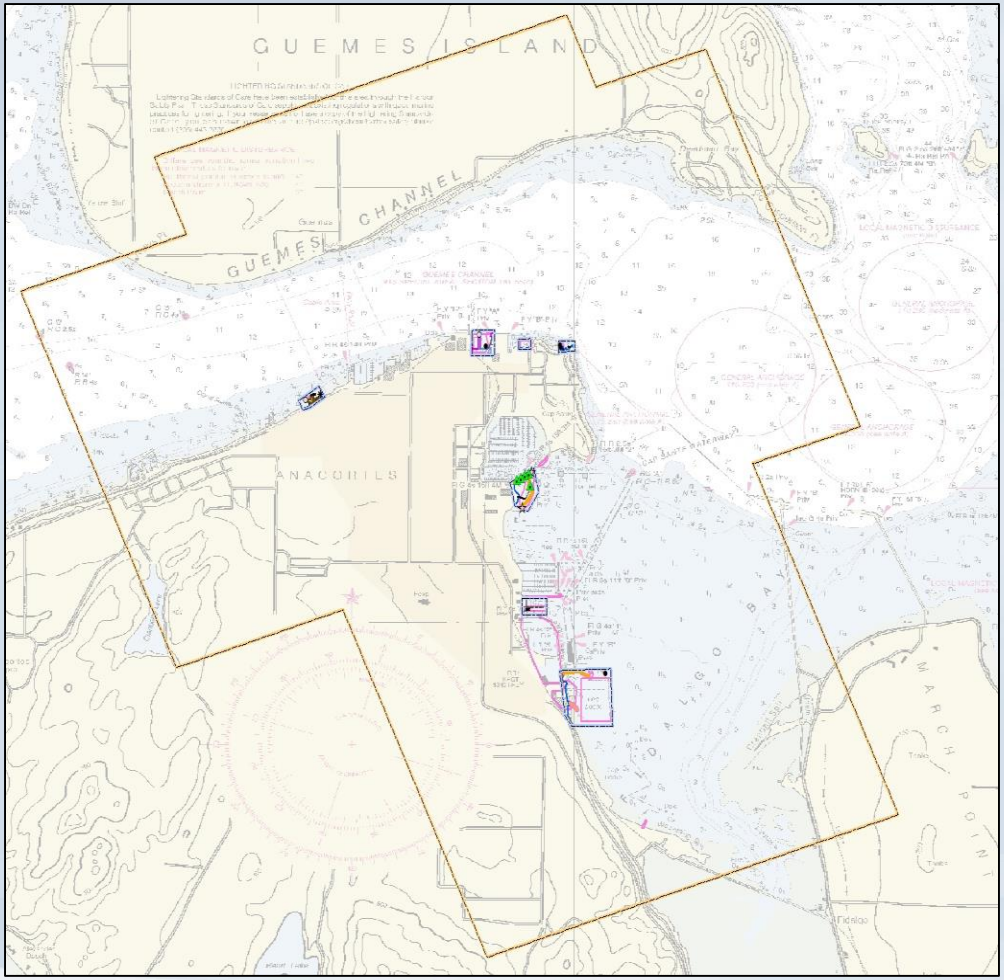
(All units in mm.)	GC Specification
Minimum width for double-line Pier/Jetty/Breakwater/Groin	0.3
Minimum distance from shore for Pier/Jetty/Breakwater/Groin (furthest point)	0.5
Minimum separation for parallel Pier/Jetty/Breakwater/Groin (finger piers)	0.5
Minimum size of Building (longest edge)	0.5
Building less than minimum size	Do not compile, unless in water, then compile as point obstruction
Minimum size of cylindrical Tank (diameter)	0.5
Cylinder (Tank) less than minimum size	Do not compile, unless in water, then compile as point obstruction
Minimum size of Island (longest dimension)	0.5
Bare Rock (Islet) less than minimum size	Compile as Point Obstruction - Rock.Bare
Minimum size of linear obstruction (longest dimension)	0.5
Minimum distance from shore for linear obstruction (furthest point)	1.0
Minimum distance from shore for point obstruction	1.0
Minimum distance from shore for ledge (furthest point)	1.0
Minimum size of Rock/Reef that Covers/Uncovers (longest dimension)	0.5
Covers/Uncovers Rock/Reef less than minimum size	Compile as Point Obstruction - Rock.Covers/Uncovers
Minimum distance from shore for Piles/Dolphins/Stakes	0.5
Minimum separation of Piles/Dolphins/Stakes from other features	0.5
Maximum size of point Dolphin	0.5
Dolphin larger than maximum size for point feature	Compile as Shoreline - Man-made.Bulkhead Or Sea Wall
Minimum distance from shore for depth contour (furthest point)	1.0

Chart Evaluation File



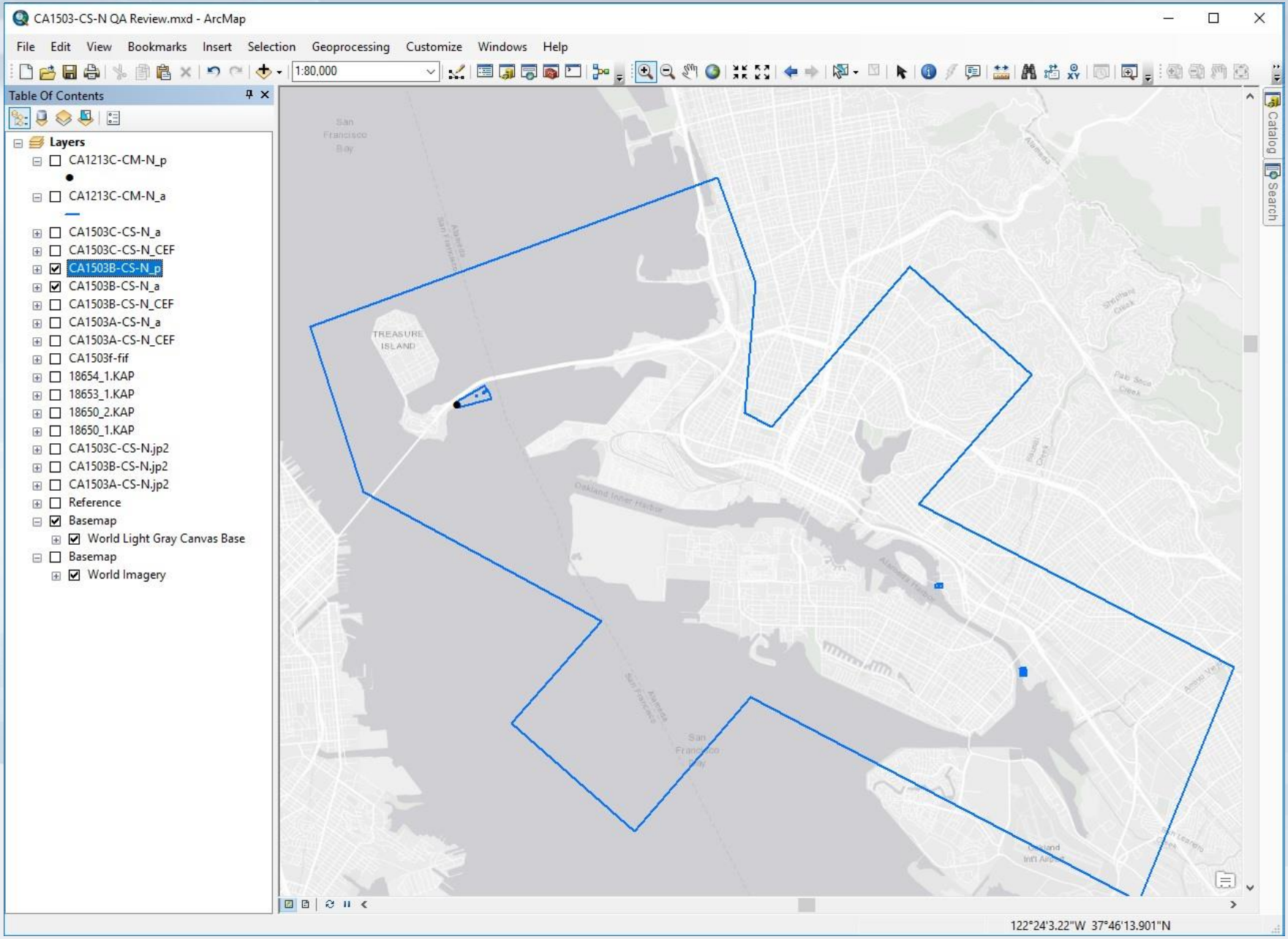
CSCAP: Coast and Shoreline Change Analysis Program

- Compare charts in priority ports to recent imagery
- Identify discrepancies
- Compile targeted updates
- Outcome: Much more frequent updates to critical port infrastructure

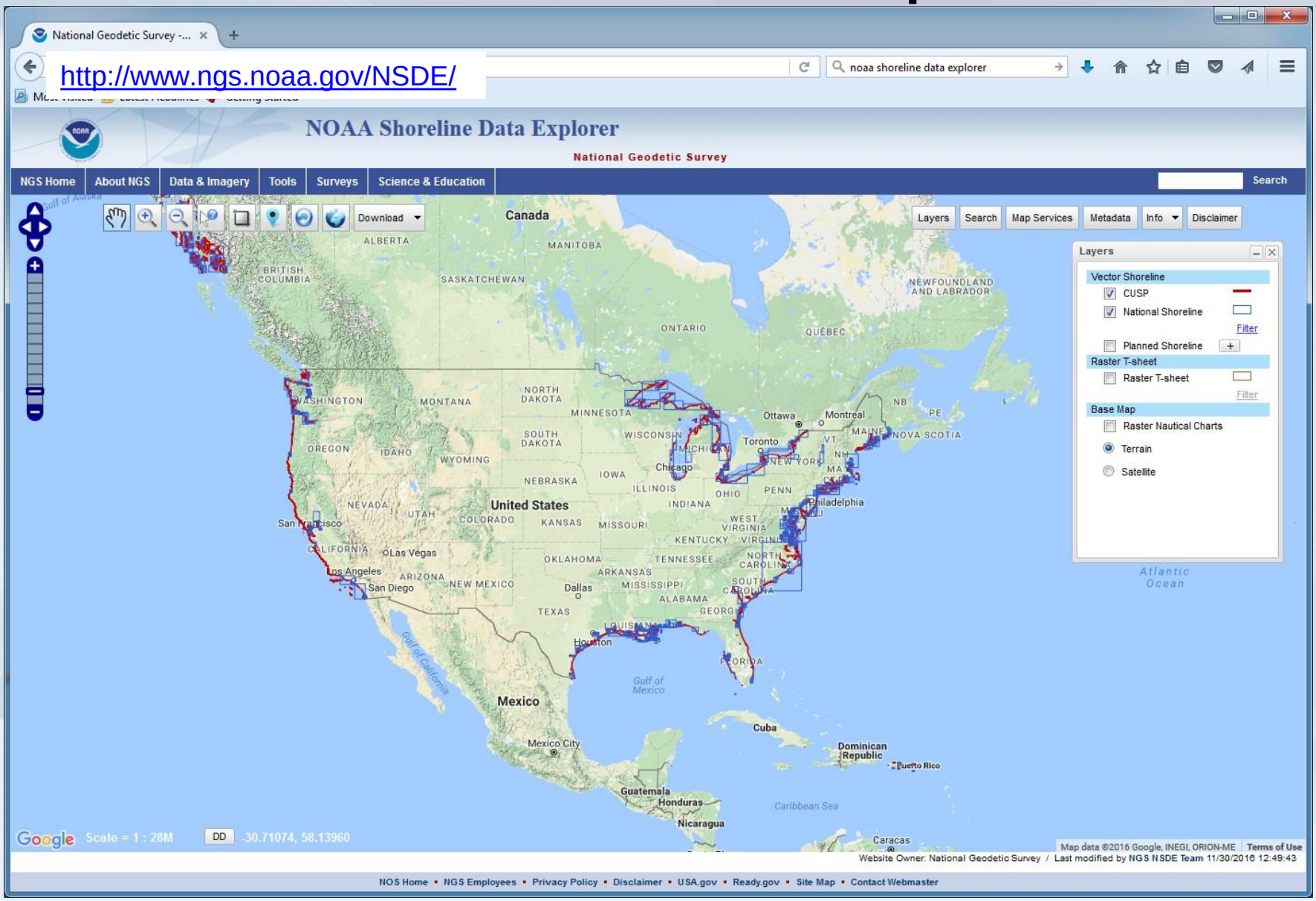


National Oceanic and Atmospheric Administration

Example: Full Compilation vs. Targeted Updates

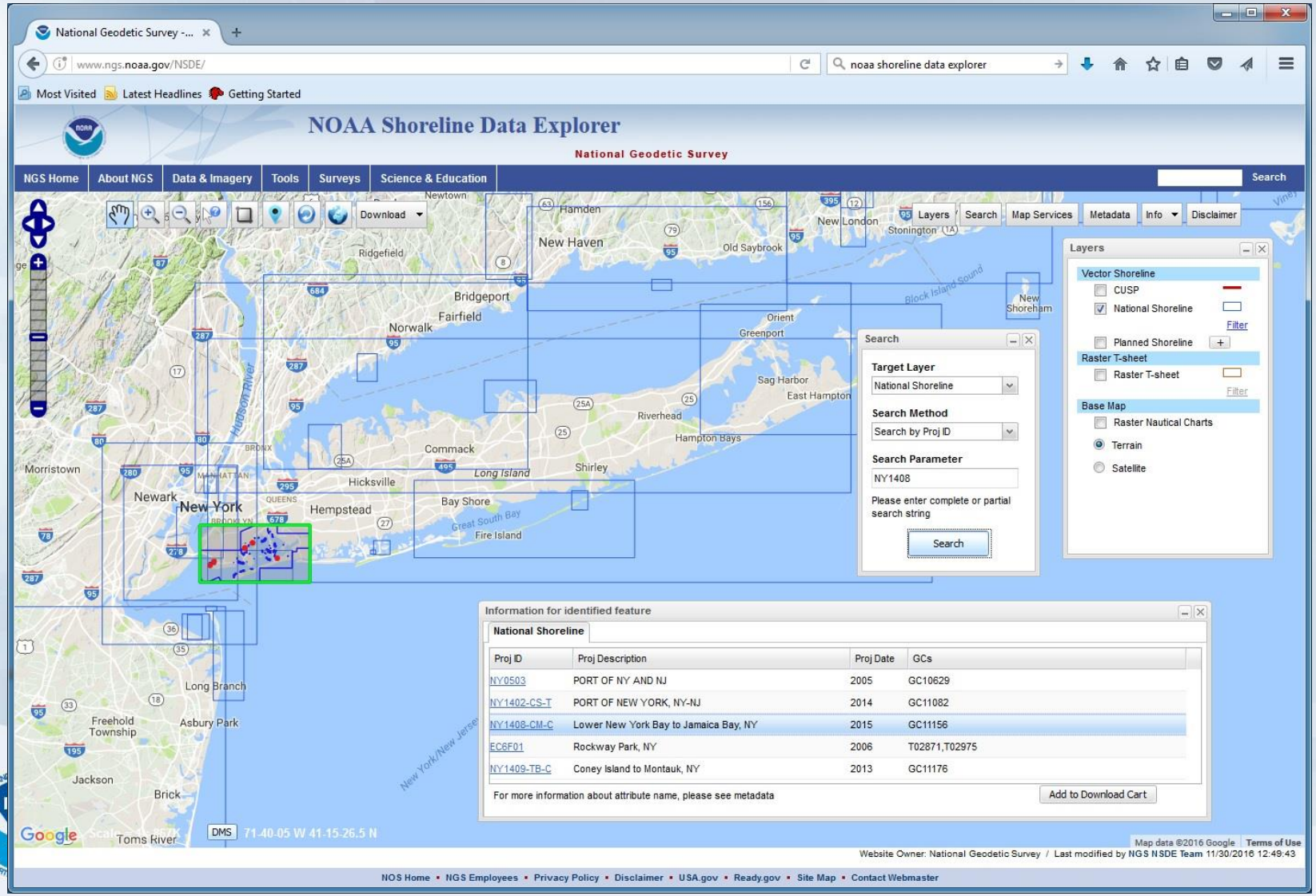


Access shoreline data from the NOAA Shoreline Data Explorer



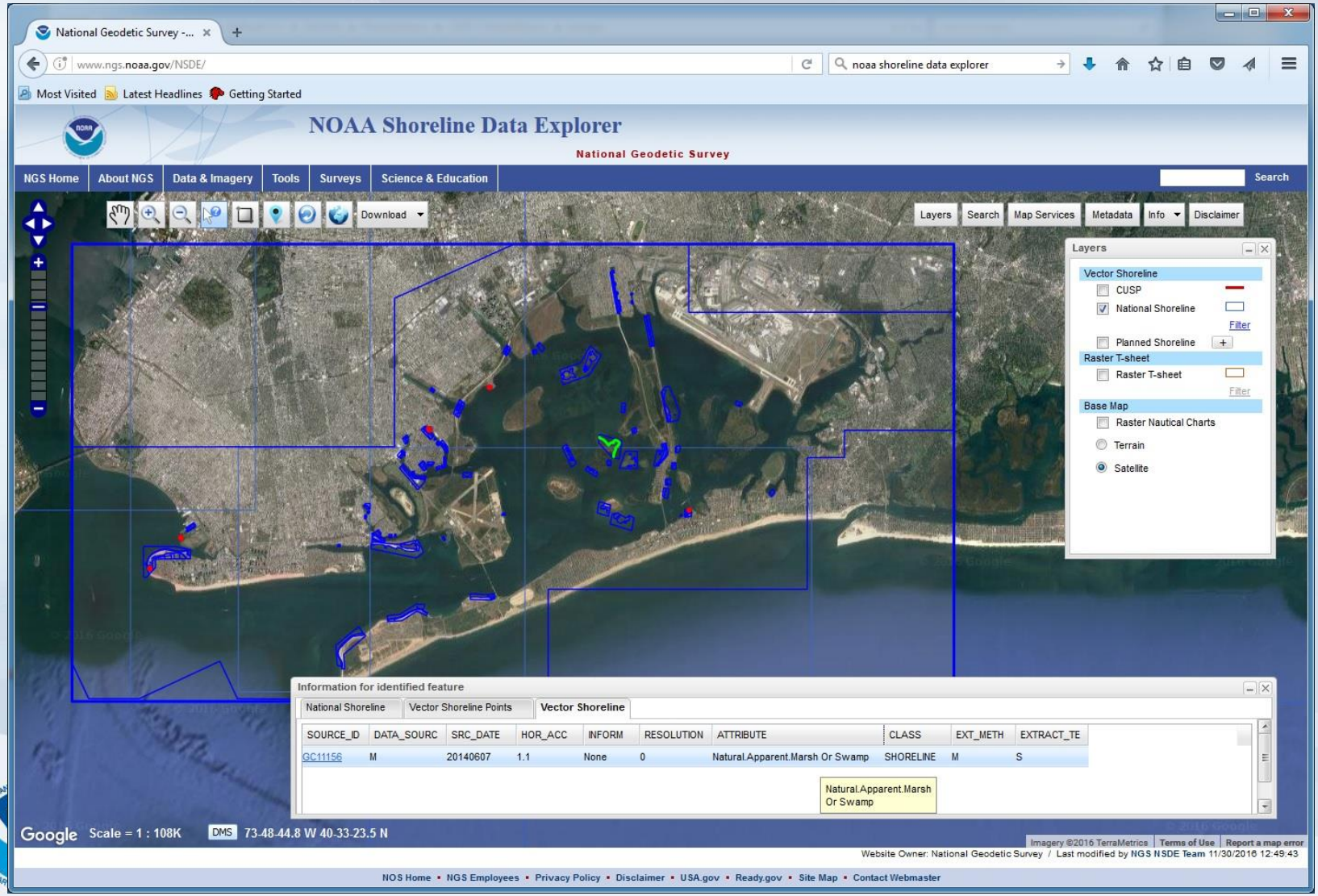
NOAA Shoreline Data Explorer

Search for, select, and display National Shoreline data geographically, or by entering the Project ID or GC Number into the Search tool.



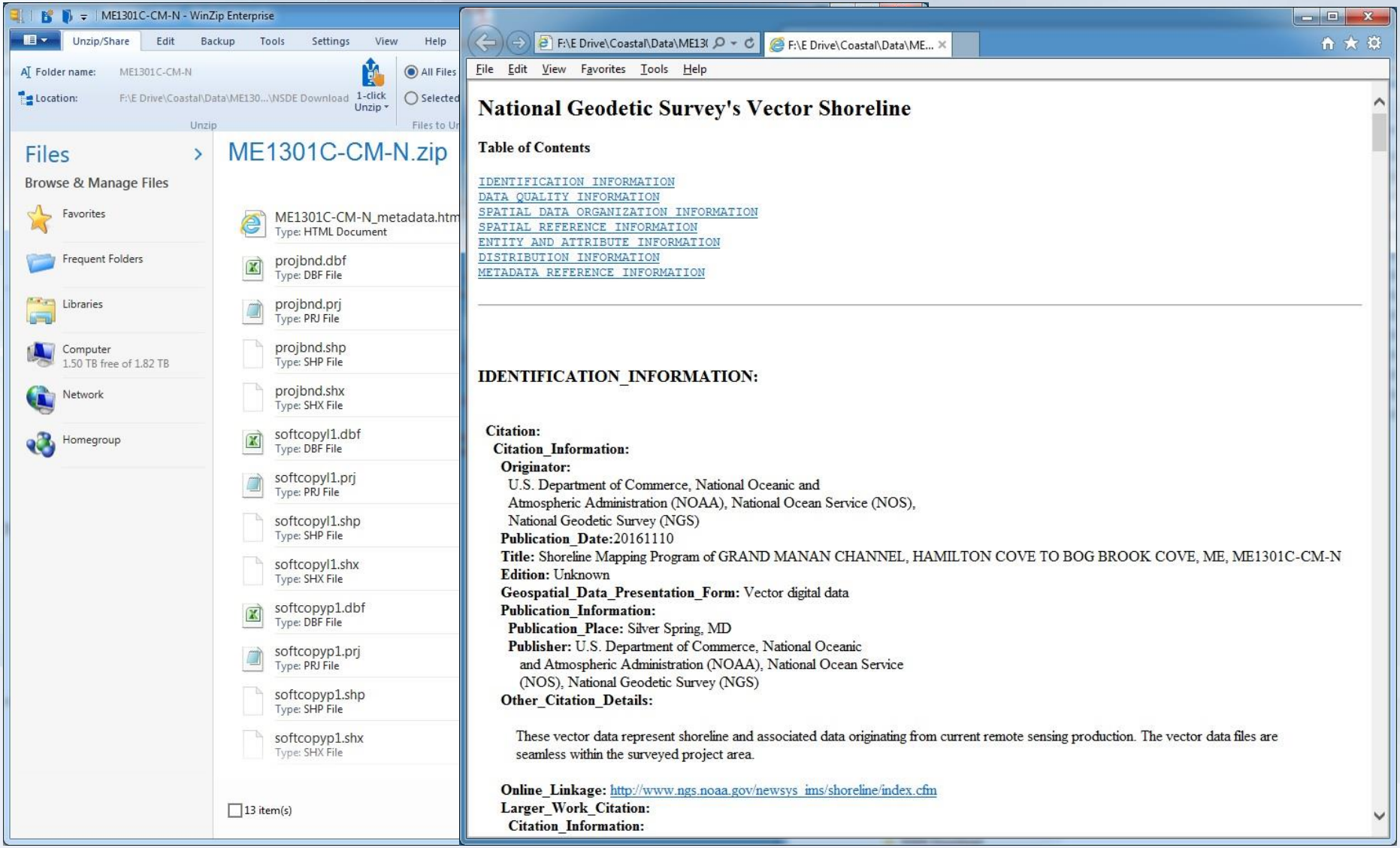
NOAA Shoreline Data Explorer

Once the vectors are displayed, individual features can be identified and the feature attributes are shown in the information box.



NOAA Shoreline Data Explorer

Up to five projects can be added to the Download Cart.



Questions?

Tim Blackford
Lead CMP Quality Assurance Cartographer, NGS/NOAA
Tim.Blackford@noaa.gov

Michael Espey
Chief, Applications Branch, NGS/NOAA
Mike.Espey@noaa.gov